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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

IN RE APPLICATION:	Piech
SERIAL NO.:	09/751,922
FILED:	12/29/2000
GROUP ART UNIT:	2834
EXAMINER:	Addison, K.
FOR:	INTEGRALLY SKEWED PERMANENT MAGNET FOR USE IN AN ELECTRIC MACHINE

APPEAL BRIEF

Box AF
Assistant Commissioner of Patents
Washington, D.C. 20231

Dear Sir:

The Notice of Appeal in this application was entered on January 3, 2003. Appellant now submits its brief in the above-referenced application.

Real Party in Interest

Otis Elevator Company is the real party in interest.

Related Appeals and Interferences

There are no related appeals or interferences.

Status of the Claims

Claim 1-17 stand finally rejected. Claims 1-17 were rejected under 35 U.S.C. §112, second paragraph; claims 1-3, 9, 11-15 and 18[1] were rejected under 35 U.S.C. §102(b); and claim 10 was rejected under 35 U.S.C. §103.

The Examiner has already indicated that Claims 4-8 and 16 contain allowable subject matter. Claims 18-20 have been cancelled. Claims 21-23 are allowed.

Status of Amendments

There are no unentered amendments.

Summary of the Invention

This invention relates to magnets that have a unique configuration that addresses the flux disturbance problem often present in electric motor designs. According to this invention, a magnet has a body with a central axis. The magnetic field of the magnet is skewed or non-parallel with the magnet body axis.

According to the claims on appeal, at least one entire edge of the magnet body is aligned parallel with the axis of the magnet body. The combined physical configuration and skewed magnetic field orientation is nowhere shown or suggested within the art.

Taking the example embodiment of Figure 2, a magnet 30 designed according to this invention has a first side 32 (the underside, which is not visible in Figure 2) and a second side 34 (the upwardly facing side of Figure 2). In this example, the second side 34 of the magnet 30 includes a first surface 36, which is skewed relative to the body

[1] Claim 18 was cancelled. Applicant assumes that the Examiner means to reject claim 17 for the remainder of this brief.

centerline or axis 35 of the magnet 30. A second surface 38 and a third surface 40 complete the second side 34 of the example magnet. (Page 3, lines 20-22, page 4, lines 1-4).

As can be appreciated form the drawing, the surface 36 has two edges that are parallel to each other but not parallel to the centerline or axis 35 of the magnet body. The same is true of the surfaces 36 in the example embodiments of Figures 3 and 4, for example.

The entire length of at least one edge of the magnet (i.e., the edge viewed on the far right of Figure 2, corresponding to the dimensional indicator L) is aligned parallel with the body axis 35.

The physical configuration (i.e., the arrangement of surfaces on the second side 34) of the magnet 30 provides a magnetic field that has a field centerline that is not aligned with (i.e., not parallel to) the body axis 35. Therefore, when a magnet 30 is supported on a rotor in an electric motor such that the magnet body centerline is aligned with the rotor axis, the magnetic field of each magnet is not aligned with the rotor axis.

In some examples, the thickness (i.e., the distance between the first and second sides of the magnet body) varies along the length of the magnet. That thickness may also vary across a single surface on the magnet. This is seen, for example, in the example of Figure 3 where the surface 36 has a thickness T_1 at some points and a smaller thickness T_2 at other points.

The physical configuration of the magnet surfaces, varied in accordance with this invention, provides magnets having the capability for attenuating flux disturbances

in an electric motor while facilitating relatively easy placement of the magnets in a motor assembly, both overcoming problems in the prior art.

Claim 1 recites a magnet comprising a body having a central axis with at least one edge aligned parallel to the axis along an entire length of the edge. The magnet of claim 1 also has a magnetic field having a centerline that is skewed relative to the body central axis. Independent claim 11 places such a magnet into a motor assembly. The various dependent claims add structural features as described below when they are pertinent to the separate patentability of the claims.

Issues

Whether the final rejection under 35 U.S.C. §112 is proper when the claims can be plainly read on more than one example embodiment shown in the figures and described in the specification.

Whether the final rejection under 35 U.S.C. §102(b) of Claims 1-3, 9, 11-15 and 17 is proper when the reference relied upon by the Examiner nowhere shows a magnet or motor having a magnet with the claimed combination of magnet configuration and magnetic field centerline orientation.

Whether the rejection under 35 U.S.C. §103 of Claim 10 presents a *prima facie* case of obviousness where the combination of references fails to establish the combination recited in claim 10.

Grouping of Claims

The Examiner has already admitted that Claims 4-8 and 16 contain allowable subject matter.

Every rejection of Claims 1-17 is contested.

Claims 9-10 depend from claim 1.

Claims 12-18 depend from Claim 11.

1. **The Rejection Under 35 U.S.C. §112**

Claims 1-17 stand or fall together with regard to the rejection under 35 U.S.C. §112. The language with which the Examiner takes issue is within both independent claims on appeal.

2. **The Rejection Under 35 U.S.C. §102(b)**

Claims 1-3, 9, 11-15 and 17 were rejected under 35 U.S.C. §102(b).

Claims 1, 9 and 11 stand or fall together.

Claims 2 and 3 stand or fall together, but are separately patentable from the other claims.

Claims 12-15 stand or fall together, but are separately patentable from the other claims.

Claim 17 stands alone.

3. **The Rejection Under 35 U.S.C. §103**

Claim 10 is the only claim rejected under 35 U.S.C. §103 and it stands alone.

Argument

INTRODUCTION

The claims are clear and there is no proper basis for a rejection under 35 U.S.C. §112. The plain language of the claims can be readily appreciated by reading the claims and, if necessary, observing the drawings, for example. The claims are not anticipated because none of the prior art shows the combination of a magnet configuration and magnetic field orientation as stated in the claims.

THE CITED REFERENCES

A. U.S. Patent No. 5,034,642 ("the *Hoemann, et al.* reference")

The *Hoemann, et al.* reference discloses a permanent magnet rotor having sensor field sections 21 and main rotor field sections 19. The main contribution to the art of the *Hoemann, et al.* reference is having the "two part" rotor 15 with a main rotor field section 19 and a sensor field section 21. The sensor field section 21 is substantially shorter then the main rotor field section and is disposed at one end of the main rotor field section to allow for sensing rotor position in a manner that does not require complex controls to account for the skewing of the main rotor section. The sensor field sections 21 locate the "neutral locations" in the main rotor field section 19.

The Examiner relies upon the *Hoemann, et al.* reference as follows:

> *Hoemann, et al.* discloses in 1 a magnet having a body (15) having a central axis (x) with at least one edge (A dash lines) aligned parallel with the rotor along the entire length of the edge of the magnetic field having a centerline that is skewed and aligned parallel to the rotor. The magnet also have a first side (25) that faces in a first direction and a second side (27) facing the opposite the first side. Wherein, the second side includes at least one surface that is oriented to be non-

parallel with the central axis fig 8-10 of the rotor body and the first side is generally planar.

(Final Office Action, page 3).

The *Hoemann, et al.* reference does not disclose what the Examiner contends. None of the example embodiments in the *Hoemann, et al.* reference disclose the claimed combination. Focusing on Figure 1, which is what the Examiner apparently has done, the "sensor field section 21 is magnetized in circumferentially disposed parallel strips of alternating magnetic polarity including strips 21A, 21B, 21C and 21D, which strips are generally parallel to the longitudinal axis of the rotor." (Column 2, lines 55-59).

The "main rotor field section 19 also has longitudinally extending strips of alternating magnetic polarity, labeled 19A, 19B, 19C and 19D....Each main field section strip is skewed in a predetermined pattern in which a first portion 25 runs generally at a first predetermined non-zero angle with respect to the longitudinal axis of the rotor, a second portion 27 runs generally at a second predetermined non-zero angle with respect to the longitudinal axis of the rotor, and a third portion 29 runs generally at the first predetermined non-zero angle with respect to the longitudinal axis of the rotor." (Column 2, line 63-column 3, line 8).

Neither the sensor field section, nor the main rotor field section of any of the magnetic strips in the *Hoemann, et al.* reference have a magnetic field that is not aligned with a central axis of the body combined with at least one edge that is parallel to the body axis along the entire length of that edge. Even the combination of the sensor field sections 21 and the main rotor field sections 19, which are taught to be integrally

formed together in the *Hoemann, et al.* reference does not provide the claimed arrangement.

At best, the *Hoemann, et al.* reference discloses a plurality of sections (i.e., 21, 25, 27 and 29) that are arranged in a herringbone fashion to provide a skew angle of a magnetic strip as shown by the angle β in Figure 10 and as described in the *Hoemann, et al.* reference in column 3, line 44-column 4, line 58.

None of the strips nor any of their sections, taken alone or together, provide a magnet having a body with a central axis and at least one edge that is parallel to that axis along the entire edge combined with a magnetic field that is not parallel to the body axis.

B. United States Patent No. 4,341,969 ("the Sievert reference")

The *Sievert* reference is cited by the Examiner for showing a magnet 14 having a rounded surface that facilitates mounting it onto a rotor or stator component. As will become apparent below, the addition of the *Sievert* reference teachings to the *Hoemann, et al.* reference do not remedy the defects in the *Hoemann, et al.* reference compared to the claims such that even the combination of the *Hoemann, et al.* reference and the *Sievert* reference does not result in the claimed combination as contended by the Examiner.

THE REJECTION UNDER 35 U.S.C. §112 IS IMPROPER

The Examiner has rejected claims 1-17 because the Examiner does not understand the phrase "a body having a central axis with at least one edge aligned

parallel to said axis along an entire length of the edge." To quote the Examiner, the Examiner "is not clear on which edge of the body is aligned parallel to axis."

Any one of the edges could be the one of the magnet that is aligned parallel with the central axis. The claims need not recite a particular edge any more particularly than as recited. The magnet body of the claims clearly has at least one edge that is entirely parallel to the main or central axis of the body (i.e., parallel along the entire length of that edge).

Taking Figure 2 as an example, the edge of the magnet 30 that is on the farthest right (in the drawing) and corresponds to the dimensional indicator L is clearly parallel to the central axis 35 of that magnet. The same is true of the right-most edge of the magnets in Figures 3 and 4. It follows that by simply looking at any one of the drawings of Figures 2-4, for example, one skilled in the art readily understands how there is at least one edge of the magnet body aligned parallel with the central axis of the magnet body.

The rejection under 35 U.S.C. §112 must be reversed.

THE REJECTION UNDER 35 U.S.C. §102(b) IS IMPROPER

The Examiner has rejected claims 1-3, 9, 11-15 and 17 as being anticipated by the *Hoemann, et al.* reference. As described above. the *Hoemann, et al.* reference does not show a single instance of a magnet having a body with a central axis, at least one edge aligned parallel to that central axis along the entire length of that edge and a magnetic field that is not aligned with the axis. That claimed combination is nowhere shown or suggested in the *Hoemann, et al.* reference.

Instead, the *Hoemann, et al.* reference teaches sensor field sections 21 that are parallel to the central axis of the rotor of the *Hoemann, et al.* reference so that those sensor field sections can be located at the "neutral location" of the main rotor field sections 19. The sensor field sections do not have a magnetic field that is not parallel to the body of those sections. If it were, the entire advantage of using those sensor field sections would be lost. In other words, the sensor field sections must have a magnetic field aligned with the central axis of those sections or they would be difficult to accurately locate and would become effectively useless according to the teachings of *Hoemann, et al.*

The main rotor field sections 19 cannot satisfy the claims. The herringbone configuration of the portions 25, 27 and 29 render the main rotor field sections without a single edge that remains parallel to the central body axis along the entire edge. If one takes the entire main rotor field section as a single magnet, the central axis of that magnet body would be a horizontal line through the center (averaged) along the length. This could be considered the zero magnetization line 43 in Figure 8, for example. There is no single edge of the magnet that remains parallel to that axis along any portion of its length, let alone the entire length.

If one were to separate out each portion 25, 27 and 29 of the main rotor field sections, then one is left with each portion having a magnetic field that is parallel to the central body axis of each portion. For example, the portion 27 would have a downward, (from left to right) angled central axis and a corresponding magnetic field. Therefore, if one took just the section 27 as an example, it would have a magnetic field aligned parallel with the body axis of that section.

No matter how one picks apart the *Hoemann, et al.* reference (or takes the entire teachings in combination), the result is not the same as the claimed combination.

The claimed physical configuration of the magnet combined with the alignment of the magnetic field relative to the body axis is nowhere shown or suggested in the *Hoemann, et al.* reference. The rejection under 35 U.S.C. §102(b) must be reversed.

THE REJECTION UNDER 35 U.S.C. §103 IS IMPROPER

It is axiomatic that a proposed combination of references must meet every limitation of the claims in order to render them obvious. Claim 10 cannot be considered obvious because even if the combination were made, the result is not the same as the claimed combination. As discussed above, the *Hoemann, et al.* reference fails to disclose or in any way suggest the combination of a magnet body having a central axis with at least one edge aligned parallel with that axis along the entire length of that edge and a magnetic field that is not aligned with that axis.

The rejection under 35 U.S.C. §103 must be reversed.

CLAIMS 1, 9 AND 11 ARE ALLOWABLE

Claims 1 and 11 are independent claims. Claim 1 includes, in part, "a [magnet] body having a central axis with at least one edge aligned parallel to said axis along an entire length of said edge and a magnetic field having a centerline that is skewed relative to the body central axis." Claim 11 recites a motor assembly and a rotor axis rather than the magnet body axis.

Neither arrangement is shown or suggested by the *Hoemann, et al.* reference. There is nothing within the *Hoemann, et al.* reference that shows a single magnet (or any portion thereof) that has the claimed combination. There is no anticipation.

CLAIMS 2 AND 3 ARE ALLOWABLE

In addition to the reasons why Claim 1 is allowable, Claims 2 and 3 add further structural limitations to the magnet body that are separately patentable. Claim 2 recites that one side of the magnet has "at least one surface that is oriented to be non-parallel with the body central axis." This claim covers arrangements such as those shown in Figures 2-4 of the present application, each of which includes a surface 36 on one side of the magnet that is not aligned with the body axis. Utilizing such a surface allows for having the skewed relationship between the centerline of the magnetic field and the body axis. Such a surface is nowhere shown or disclosed in the art and is separately patentable as one example way of achieving the combination claimed in Claim 1.

CLAIMS 12-15 ARE ALLOWABLE

Like Claim 2, Claim 12 adds the limitation of including "at least one surface that is non-parallel with the rotor axis." Such a non-parallel surface is nowhere shown or suggested within the art and should be considered separately patentable from the more generic recitations of Claim 11. Claims 13-15 depend from Claim 12 and are allowable.

CLAIM 17 IS ALLOWABLE

Nothing in any cited reference shows or suggests the additional ramped limitations recited in Claim 17.

CONCLUSION

The language of the claims is plainly understood and a quick reference to any one or several of the drawings almost instantly provides the answer to any potential question regarding the claim language. The *Hoemann, et al.* reference does not disclose or suggest, in any way, the claimed combination. All rejections must be reversed.

Respectfully submitted,

CARLSON, GASKEY & OLDS, P.C.

March 3, 2003
Date

David J. Gaskey
Registration No. 37,139
400 W. Maple, Suite 350
Birmingham, MI 48009
(248) 988-8360

CERTIFICATE OF MAIL

I hereby certify that the enclosed **Appeal Brief and Credit Card Payment Form** is being deposited with the United States Postal Service as First Class Mail, postage prepaid, in an envelope addressed to Assistant Commissioner of Patents, Washington D.C. 20231 on March 3, 2003.

Theresa M. Palmateer

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APPENDIX OF CLAIMS

1. A magnet for use in a magnetic motor assembly, comprising:

a body having a central axis with at least one edge aligned parallel to said axis along an entire length of said edge and a magnetic field having a centerline that is skewed relative to the body central axis.

2. The magnet of claim 1, including a first side that faces in a first direction and a second side facing opposite the first side, the second side including at least one surface that is oriented to be nonparallel with the body central axis.

3. The magnet of claim 2, wherein the second side surface includes edges that are nonparallel with the body central axis.

4. The magnet of claim 2, including a distance between the second side surface and the first side that varies along a length of the body.

5. The magnet of claim 4, wherein the second side surface is ramped relative to the first side.

6. The magnet of claim 2, including a plurality of surfaces on the second side, a first one of the surfaces having a constant width and a second one of the surfaces having a varying width.

7. The magnet of claim 6, wherein a distance between the first side and the second one of the surfaces varies along the width of the second one of the surfaces.

8. The magnet of claim 7, wherein the distance is greatest at a location where the second one of the surfaces is adjacent the first one of the surfaces and the distance is smallest at an edge of the second one of the surfaces adjacent an edge of the body.

9. The magnet of claim 2, wherein the first side is generally planar.

10. The magnet of claim 2, wherein the first side is curved.

11. A motor assembly, comprising:

a stator;

a rotor that rotates about a rotor axis relative to the stator; and

a plurality of magnets supported by either the rotor or the stator, each of the magnets having a body with at least one edge aligned parallel with the rotor axis along the entire length of said edge and a magnetic field with a centerline that is not aligned with the rotor axis.

12. The assembly of claim 11, wherein each magnet includes a first side facing the stator or the rotor and a second side facing the other of the stator or the rotor, the second side of each magnet including at least one surface that is nonparallel with the rotor axis.

13. The assembly of claim 12, wherein the first side of the magnets is configured to conform to a corresponding surface on the stator or the rotor.

14. The assembly of claim 12, wherein the second side surface includes edges that are nonparallel with the rotor axis.

15. The assembly of claim 14, wherein the second side surface edges are parallel to each other.

16. The assembly of claim 12, including a distance between the second side surface and the first side that varies along a length of the body.

17. The assembly of claim 16, wherein the second side surface is ramped relative to the first side.